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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/614,996	07/08/2003	Donna M. Hale	706315US1	8173

24938 7590 11/04/2005

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EXAMINER	
LARKIN, DANIEL SEAN	
ART UNIT	**PAPER NUMBER**
2856	

DATE MAILED: 11/04/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/614,996	HALE ET AL.	
	Examiner	Art Unit	
	Daniel S. Larkin	2856	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *23 August 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *2-7,9-19 and 21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *2-7, 9-19, and 21* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *08 July 2003* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. The drawings are objected to because reference box "30", as shown in the figure should also be labeled -- Interface Circuitry -- in order to more easily identify the structure of the invention without have to look to the specification for guidance.

2. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference character "28" has been used to designate both a "transducer" and a "fuel level output signal".

3. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description:

Reference numeral -- 34 -- does not appear within the drawing figure contrary to the suggestion of the disclosure on page 5, line 1.

4. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement

sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 2, 3, and 5-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 55-69024 (Mizuguchi et al.) in view of US 5,184,510 (Rossman).

With respect to the limitations of claim 2, the reference to Mizuguchi et al. discloses a liquid level meter, as shown in Figure 4, comprising: an acoustic/ultrasonic transducer (13) for transmitting and receiving a reflected signal; a float (15) for remaining buoyant at the surface of the liquid in the tank, the float (15) having a reflective portion (16) located within a concave portion (17) of the float (see Figure 5) and positioned to receive the acoustic signal and reflect therefrom the reflected signal;

and circuitry means for collecting the reflected signals and determining the liquid level. The reference to Mizuguchi et al. fails to disclose that the transducer is disposed directly above the reflective portion of the float; or an interface circuit arranged to measure an elapsed time between transmission of an acoustic signals and receipt of the signal as a function of the liquid level.

The reference to Rossman discloses a liquid level sensor, comprising an ultrasonic sensor (50) mounted directly above a reflective surface of a float (10) to receive reflected signals directed towards the float; and circuit means for equating the time differential between transmission of an acoustic wave and the reception of the reflected wave with the distance of the float (10) from the ultrasonic sensor (50), thus relating to the liquid level in a storage tank. Modifying the position of the transducer and the orientation of the float with that shown in Rossman would have been obvious to one of ordinary skill in the art as a means of eliminating possible contamination of the transducer face which would in turn allow the transducer to detect the reflected signals more accurately as well as allow the transducer to have a longer life expectancy. Modifying the system of Mizuguchi et al. to provide a circuit that measures elapsed time as a function of liquid level would have been obvious to one of ordinary skill in the art given that measuring the elapsed time of transmitted and reflected acoustic signals is a well-known and extremely accurate measurement used to measure the distance between two objects.

As to the limitation of measuring fuel level, the examiner argues that the type of fluid makes no difference in the measurements made in Mizuguchi et al. or Rossman; and therefore, each reference has the ability to accurately measure fuel level.

With respect to the limitation of claim 3, the reference to Mizuguchi et al. discloses that the reflective portion is integral to the float, as shown in Figure 5. The reference fails to expressly disclose the substance of the reflective material (16); however, the examiner argues that the use of metal as a reflective material is well known in the art.

With respect to the limitations of claims 5-7, the references to Mizuguchi et al. and Rossman both fail to expressly disclose what type of output signal is used to generate a liquid level determination; however, the examiner takes Official Notice that output signals from a circuit/microprocessor can take the form of a resistance value, a current value, or a network message value, that may later be used to determine a liquid level or be used by a secondary device, or to alert an operator.

7. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over JP 55-69024 (Mizuguchi et al.) in view of US 5,184,510 (Rossman) as applied to claim 2 above, and further in view of In re Leshin.

With respect to the limitation of claim 4, the reference to Mizuguchi et al. fails to expressly recite the material composition of the float. The reference to Rossman discloses that the ball/float is made of a thin plastic, which would have some compressibility. With respect to the density of the float, the examiner argues that one of

ordinary skill in the art would choose a float having a density that is compatible with the liquid being measured. Moreover, the courts have held that mere selection of a known material to make a device previously made of that material based on suitability for intended use would be obvious (In re Leshin, 125 USPQ 416 (CCPA 1960)).

8. Claims 9-11 and 15-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 55-69024 (Mizuguchi et al.) in view of US 5,184,510 (Rossman) and US 4,627,283 (Nishida et al.).

With respect to the limitations of claim 9, the reference to Mizuguchi et al. discloses a liquid level meter, as shown in Figure 4, comprising: an acoustic/ultrasonic transducer (13) for transmitting and receiving a reflected signal; a float (15) for remaining buoyant at the surface of the liquid in the tank, the float (15) having a reflective portion (16), see Figure 5, and positioned to receive the acoustic signal and reflect therefrom the reflected signal; and circuitry means for collecting the reflected signals and determining the liquid level. The reference to Mizuguchi et al. fails to disclose that the transducer is disposed directly above the reflective portion of the float; an interface circuit arranged to measure an elapsed time between transmission of an acoustic signals and receipt of the signal as a function of the liquid level; or a centering rod fixed to a top surface of a tank and being in sliding arrangement with the float.

The reference to Rossman discloses a liquid level sensor, comprising an ultrasonic sensor (50) mounted directly above a reflective surface of a float (10) to receive reflected signals directed towards the float; and circuit means for equating the

time differential between transmission of an acoustic wave and the reception of the reflected wave with the distance of the float (10) from the ultrasonic sensor (50), thus relating to the liquid level in a storage tank. Modifying the position of the transducer and the orientation of the float with that shown in Rossman would have been obvious to one of ordinary skill in the art as a means of eliminating possible contamination of the transducer face which would in turn allow the transducer to detect the reflected signals more accurately as well as allow the transducer to have a longer life expectancy. Modifying the system of Mizuguchi et al. to provide a circuit that measures elapsed time as a function of liquid level would have been obvious to one of ordinary skill in the art given that measuring the elapsed time of transmitted and reflected acoustic signals is a well-known and extremely accurate measurement used to measure the distance between two objects. The references to Mizuguchi et al. and Rossman both fail to disclose a centering rod.

The reference to Nishida et al. discloses a fuel level detector, comprising: a centering rod/strut (5) with a float (9) displaced around the rod/strut (5). Modifying the float of Mizuguchi et al. to include a centering rod would have been obvious to one of ordinary skill in the art as a means of increasing measurement accuracy by allowing the float and the reflector to be in transmission and reflection alignment, thus minimizing errors due to the float being out of position.

As to the limitation of measuring fuel level, the examiner argues that the type of fluid makes no difference in the measurements made in Mizuguchi et al. or Rossman;

With respect to the limitation of claim 10, the reference to Mizuguchi et al. discloses that the reflective portion (16) of the float (15) is concave (17).

With respect to the limitation of claim 11, the reference to Mizuguchi et al. discloses that the reflective portion is integral to the float, as shown in Figure 5. The reference fails to expressly disclose the substance of the reflective material (16); however, the examiner argues that the use of metal as a reflective material is well known in the art.

With respect to the limitation of claim 15, the references to Mizuguchi et al. and Rossman both fail to disclose a spring attached to the center rod. The reference to Nishida et al. discloses a spring (7) mounted at one end to a mounted base (1) attached to a tank (15) and at the other end to the centering rod/strut (5). Providing a spring attached to the centering rod would have been obvious to one of ordinary skill in the art as a means of urging the rod/strut towards the bottom of the tank (15).

With respect to the limitations of claims 16-19, the references to Mizuguchi et al. and Rossman both fail to expressly disclose what type of output signal is used to generate a liquid level determination; however, the examiner takes Official Notice that output signals from a circuit/microprocessor can take the form of a voltage value, a resistance value, a current value, or a network message value, that may later be used to determine a liquid level or be used to alert an operator.

9. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over JP 55-69024 (Mizuguchi et al.) in view of US 5,184,510 (Rossman) and US 4,627,283 (Nishida et al.) as applied to claim 9 above, and further in view of In re Leshin.

With respect to the limitation of claim 12, the references to Mizuguchi et al. and Nishida et al. both fail to expressly recite the material composition of the float. The reference to Rossman discloses that the ball/float is made of a thin plastic, which would have some compressibility. With respect to the density of the float, the examiner argues that one of ordinary skill in the art would choose a float having a density that is compatible with the liquid being measured. Moreover, the courts have held that mere selection of a known material to make a device previously made of that material based on suitability for intended use would be obvious (In re Leshin, 125 USPQ 416 (CCPA 1960)).

10. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over JP 55-69024 (Mizuguchi et al.) in view of US 5,184,510 (Rossman) and US 4,627,283 (Nishida et al.) as applied to claim 9 above, and further in view of US 5,483,831 (Steiner).

With respect to the limitations of claim 13, the references to Mizuguchi et al., Rossman, and Nishida et al. all fail to disclose a float having an index feature that cooperates with a mating feature located in the center rod.

The reference to Steiner ('831) discloses a direct liquid level reading device comprising a float (26) that surrounds a centering rod/guide (24). In one embodiment, as shown in Figure 4, the float (26) is provided with protrusions (34) that cooperate with

grooves (32) placed within the rod/guide (24). The use of the bearings (36) in the grooves would appear to limit movement of the float to only vertical motion. Modifying the float structure and the centering rod structure to create surfaces that cooperate with one another would have been obvious to one of ordinary skill in the art as a means of facilitating the movement of the float with respect to the rod.

11. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over JP 55-69024 (Mizuguchi et al.) in view of US 5,184,510 (Rossman), US 6,523,404 (Murphy et al.), and US 5,299,456 (Steiner).

With respect to the limitations of claim 14, the reference to Mizuguchi et al. discloses a liquid level meter, as shown in Figure 4, comprising: a tank/vessel (2); an acoustic/ultrasonic transducer (13) for transmitting and receiving a reflected signal; a float (15) for remaining buoyant at the surface of the liquid in the tank, the float (15) having a reflective portion (16), see Figure 5, and positioned to receive the acoustic signal and reflect therefrom the reflected signal; and circuitry means for collecting the reflected signals and determining the liquid level. The reference to Mizuguchi et al. fails to disclose that the transducer is disposed directly above the reflective portion of the float; an interface circuit arranged to measure an elapsed time between transmission of an acoustic signals and receipt of the signal as a function of the liquid level; a centering rod fixed to a top surface of a tank and being in sliding arrangement with the float; or a friction reducing portion mounted to the float for contacting the centering rod.

The reference to Rossman discloses a liquid level sensor, comprising an ultrasonic sensor (50) mounted directly above a reflective surface of a float (10) to receive reflected signals directed towards the float; and circuit means for equating the time differential between transmission of an acoustic wave and the reception of the reflected wave with the distance of the float (10) from the ultrasonic sensor (50), thus relating to the liquid level in a storage tank. Modifying the position of the transducer and the orientation of the float with that shown in Rossman would have been obvious to one of ordinary skill in the art as a means of eliminating possible contamination of the transducer face which would in turn allow the transducer to detect the reflected signals more accurately as well as allow the transducer to have a longer life expectancy. Modifying the system of Mizuguchi et al. to provide a circuit that measures elapsed time as a function of liquid level would have been obvious to one of ordinary skill in the art given that measuring the elapsed time of transmitted and reflected acoustic signals is a well-known and extremely accurate measurement used to measure the distance between two objects.

The references to Mizuguchi et al. and Rossman both fail to disclose a centering rod or a friction reducing portion mounted to the float for contacting the centering rod. The reference to Murphy et al. discloses an apparatus for measuring a fluid level, comprising: a tank having a top and bottom surface and a centering rod (108) with a float (112) displaced around the rod. Modifying the float of Mizuguchi et al. to include a centering rod would have been obvious to one of ordinary skill in the art as a means of increasing measurement accuracy by allowing the float and the reflector to be in

transmission and reflection alignment, thus minimizing errors due to the float being out of position. The reference to Mizuguchi et al., Rossman, and Murphy et al. all fail to disclose a friction reducing portion mounted to the float for contacting the centering rod.

The reference to Steiner ('456) discloses a dipstick comprising a centering rod/tube (54); a float (18) surround the rod/tube (54); and dimples (42) mounted to the interior surface of the float (18) and contacting the outer surface of the rod/tube (54) in order to reduce friction between the float (18) and the tube (54), see col. 4, lines 44-47 and Figure 8. Modifying the structure of the float to provide friction reducing means would have been obvious to one of ordinary skill in the art as a means of increasing measurement accuracy by significantly reducing the possibility of the float sticking to the center rod when the float moves with respect to the rod.

As to the limitation of measuring fuel level, the examiner argues that the type of fluid makes no difference in the measurements made in Mizuguchi et al. or Rossman;

12. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over JP 55-69024 (Mizuguchi et al.) in view of US 5,184,510 (Rossman) and FR 2656688 (Hennequin et al.).

With respect to the limitations of claim 21, the reference to Mizuguchi et al. discloses a method for measuring the level of liquid within a vessel, comprising: providing a float (15) having a reflective portion (16) on the surface of the liquid; transmitting an acoustic/ultrasonic wave from a fixed transducer (13) and receiving a wave reflected back from the reflective surface (16); and determining the level of liquid

within the tank/vessel (2). The reference to Mizuguchi et al. fails to disclose that the transducer is disposed directly above the reflective portion of the float; and measuring the elapsed time between transmitting the acoustic wave and receiving the reflected wave.

The reference to Rossman discloses a method for measuring the liquid level, comprising: mounting an ultrasonic sensor (50) directly above a reflective surface of a float (10) to receive reflected signals directed towards the float; and equating the time differential between transmission of an acoustic wave and the reception of the reflected wave with the distance of the float (10) from the ultrasonic sensor (50), thus equating the elapsed time to the liquid level in a storage tank. Modifying the position of the transducer and the orientation of the float with that shown in Rossman would have been obvious to one of ordinary skill in the art as a means of eliminating possible contamination of the transducer face which would in turn allow the transducer to detect the reflected signals more accurately as well as allow the transducer to have a longer life expectancy. Modifying the system of Mizuguchi et al. to provide a circuit that measures elapsed time as a function of liquid level would have been obvious to one of ordinary skill in the art given that measuring the elapsed time of transmitted and reflected acoustic signals is a well-known and extremely accurate measurement used to measure the distance between two objects. The reference to Mizuguchi et al. discloses that the reflector has a concave shape; however, the reference fails to expressly recite using a float having a parabolic shaped reflector. The reference to Rossman also fails to disclose a parabolic shaped reflector.

The reference to Hennequin et al. discloses a device for measuring the level of liquid within a tank by optical determination, whereby a light source (5) transmits a light beam towards a concave mirror (90) mounted to a float (9). Light reflected from the mirror (90) into an optoelectronic device (6) for determining the position of the float within the tank (1). Modifying the reflector surface of Mizuguchi et al. to provide a parabolic surface would have been obvious to one of ordinary skill in the art as means of increasing the float's ability to collect and reflect the transmissions of the transducer.

Response to Arguments

13. Applicant's arguments with respect to claims 2-7, 9-19, and 21 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

14. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

The reference to JP 63-205521 (Akita) discloses a liquid level measuring system comprising a spherical float (6) having a concave reflection portion.

The reference to JP 1-295127 (Isogai) discloses a manometer which utilizes a float (1) using a concave reflector (3), as shown in Figure 7B, mounted within the float.

The reference to US 6,339,959 (Natapov) discloses a magnetic float type flowmeter having a float (3) having protrusions (P, P') mounted to the outside of the float in order to reduce friction between the float (3) and walls of a tubular conduit (1).

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Daniel S. Larkin whose telephone number is 571-272-2198. The examiner can normally be reached on 8:00 AM - 5:00 PM Mon-Fri.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hezron Williams can be reached on 571-272-2208. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Daniel Larkin
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02 November 2005

DANIEL S. LARKIN
PRIMARY EXAMINER